

Toward an Environmental Assessment of Social Determinants of Health: Direct Observations of Latino Neighborhoods in Kansas City

Cara Smith (Faculty Advisor: Stephen Fawcett)

Applied Behavioral Science

ABSTRACT

The environment – including exposure to social determinants – is a major influence on health outcomes and health disparities. Direct observation may be useful in identifying factors related to disparities in health across neighborhoods. This study explored the question of whether environmental features – exposures related to social determinants – can be assessed by direct observation. A checklist and measurement protocol was created for this purpose. This two-page environmental assessment was used to document the occurrence or non-occurrence of specific features or measures in six domains: housing (N=5), safety (N=11), recreational spaces (N=5), transportation (N=5), economic factors (N=2), and access to services (N=17). Each feature (e.g., broken windows, illegal dumping, and sidewalks) was measured in selected neighborhoods in urban areas of Kansas City with higher populations of Latino residents. After pilot testing was completed, ten neighborhoods of similar population densities were selected for study. These included five neighborhoods from census tracts of higher median annual income and five from census tracts of lower median annual income. Trained coders independently recorded the occurrence or non-occurrence of environmental features while walking through the ten neighborhoods. The assessment of each neighborhood took approximately one hour to

complete. Results showed that there was a higher percentage of some negative features (e.g., broken windows, vacant houses) in lower income neighborhoods than higher-income neighborhoods. The higher-income neighborhoods had a greater percentage of some positive environmental features (e.g., childcare centers, schools, security systems etc.) than did the lower-income neighborhoods. The lower-income neighborhoods also had a higher percentage of some positive features (e.g., places of worship, parks) than did higher-income neighborhoods. Reliability of observations between independent observers suggests that the checklist may be an accurate tool for assessing environmental features related to social determinants of health.

INTRODUCTION

Research on social determinants of health suggests that physical health is affected by much more than access to primary health care (WHO Commission on Social Determinants, 2008). Only about 20% of overall health outcomes can be attributed to access to quality health care; by contrast, as much as 50% of the contribution to overall health outcomes can be attributed to the social, economic, and environmental conditions in people's lives (County Health Rankings, 2012). These social determinants – often related to income inequality – are seen as major determinants of health outcomes for populations (WHO Commission on Social Determinants, 2008).

Mechanisms by which social determinants produce health disparities include unequal exposure to environmental factors such as poor housing and living conditions (WHO Commission on Social Determinants, 2008). These differential exposures may be related to unhealthy housing, dangerous working conditions, low food availability and quality, social exclusion and barriers to adopting healthy behaviors and other risk factors (WHO Department of Ethics, Equity, Trade and Human Rights, 2010). Differential exposures to unequal health conditions are linked to health disparities, particularly for groups experiencing social exclusion such as Latinos and other racial and ethnic minorities (Braveman, 2006). Observable indicators of social determinants of health may be useful in distinguishing environmental features that may influence disparities in health across communities.

This study explored the question of whether environmental indicators that may affect health can be assessed by direct observation. The experimenter created an environmental assessment tool to test this question. The tool was used to survey higher- and lower-income Latino neighborhoods in Wyandotte County, Kansas.

METHODS

Context: Latino Health for All Coalition

This research project was conducted in support of the Latino Health for All Coalition, a community-academic partnership working with a low-income and primarily first-generation Latino community in Kansas City, Kansas. The mission of the Latino Health for All Coalition (LHFA) is to decrease rates of heart disease and diabetes in the Latino population and to increase the proportion

of Latinos who engage in healthy lifestyle choices such as physical activity and nutritious eating habits in the Kansas City area. These objectives were selected because of the need that has been documented within the community.

In the Kansas City region, Latinos experience an average life expectancy 11 years shorter than whites (Farakhan and Thompson, 2000). Specifically, Latinos in the Kansas City area are slightly less than 1 ½ times more likely to die from diabetes – the second leading cause of death for Latinos in Kansas City, Missouri (Kansas City Missouri Department of Health, 2004) – than their white counterparts (Farakhan and Thomas, 2000). Even as the mortality rates due to cardiovascular diseases among whites and African Americans in Kansas City decreased between the years 1994 and 2003, the mortality rates due to cardiovascular diseases among Latinos continued to rise (Kansas City Health Department, 2004).

The Latino Health for All Coalition has set out to empower community members to positively impact their health and the health of their community in order to create greater community change. In doing this, LHFA aims to promote health equity by identifying and addressing the social determinants that affect Latinos and other minorities in Wyandotte County while also remaining culturally sensitive (Latino Health for All, 2008). In order to accurately identify social determinants, the Latino Health for All Coalition has engaged in extensive community health assessment efforts through a grant from the Centers for Disease Control and Prevention, the Racial and Ethnic Approaches to Community Health (REACH). This environmental assessment is one of many efforts intended to learn more about

factors affecting the overall health and health disparities among socially disadvantaged groups in Wyandotte County, Kansas.

Neighborhoods

Ten neighborhoods, each within a different census tract in Wyandotte County, Kansas, were selected for this research project. Census tracts were used to identify areas with differences in median annual income and relatively high population density overall and higher Hispanic population. Each of the census tracts had a population of 900 individuals or higher and Hispanic populations of 200 individuals or higher. Census tracts with Hispanic populations of 1,000 individuals or higher were selected when there were census tracts that also fit both the income and population density requirements. Five of the neighborhoods were selected from a lower median annual income range to serve as a lower-income group, and five of the neighborhoods were selected from a higher median annual income range to serve as a higher-income group. The five census tracts selected for the lower-income group had median annual incomes in the range of \$9,694 - \$24,999, and five of the census tracts selected for the higher-income group had median annual incomes in the range of \$35,000 - \$49,999. For each census tract, the street intersection closest to the centermost geographic point of the tract was selected as the center of the data collection area. From this point, observations were conducted for one-half mile outward in each of the four directions, North, South, East and West or the closest possible approximation thereof. Each of these half-mile radius zones within a census tract served as the operational definition of a neighborhood for the study. Appendix A provides a map

of the neighborhoods involved in this study.

Measurement System

Table 1 displays the environmental assessment domains, measures and behavioral definitions used in this study. Environmental indicators for measures of social determinants were selected through literature review and social validation ratings by researchers with experience in the area. Lists of possible measures of social determinants of health were compiled from existing reports that used windshield surveys and other related methods. They included a number of domains as related candidate indicators; for instance, housing (e.g., broken windows, signs of eviction, etc.) and social order (e.g., parks, organized game courts, etc.) (Furr-Holden, Campbell, Milam, Smart, Ialongo & Leaf, 2010).

These lists of candidate measures were then presented to several experts in public health and community health. They evaluated each candidate measure using three criteria: a) its relevance to the construct of social determinants of health, b) its likelihood for feasibility of data collection, and c) its likelihood for accuracy or reliability between independent observers. Measures that scored high in all three of these categories were then selected for inclusion on the environmental checklist. Appendix B provides a data table of the candidate measures' evaluation.

A simple environmental assessment instrument (Appendix C) was then created consisting of these measures. This tool is a two-page checklist used to document the occurrence or non-occurrence of environmental features related to the domains of housing (N=5), safety (N=11), recreational spaces (N=5), transportation

(N=5), economic factors (N=2), and access to services (N=17). Observers scored for occurrence or non-occurrence of each indicator for each block surveyed within a particular neighborhood. There is also space for additional comments and qualitative description of neighborhood attributes.

Before the study took place, observers received training to help assure the accuracy of their recording. This consisted of a PowerPoint presentation that included behavioral definitions of each measure (e.g., housing – vacant dwellings) with examples and non-examples (e.g, photographs of what is by definition a vacant dwelling and what is not by definition a vacant dwelling). Table 1 contains a summary of the measures and corresponding behavioral definitions.

Table 1 – Environmental Assessment Domains, Measures, and Brief Definitions		
Domains	Measure	Definition
Housing	Broken Windows	Dwelling where any window has unrepaired cracks or missing glass as visible from the street
	Boarded Up Windows	Dwelling where any window has signs of makeshift repair (e.g., plywood, plastic sheets, etc.)
	Vacancies	Dwelling that appears to be without occupants (e.g., eviction sign, no furniture inside)
	For Sale/Rent	Dwelling with a posted sign that says "for sale" or "for rent"
	Fire Damage	Dwelling that shows signs of smoke or fire damage
Safety	Barred Windows	Any window that has two or more metal bars on the exterior side of the building
	Graffiti	Any words or symbols spray-painted onto surfaces
	Security Systems	Signs or other markers posted on a dwelling that indicate a security system is present
	Illegal Dumping	Any waste material that is larger than 1 foot by 1 foot (e.g., tires, appliances, equipment)
	Street Lights	Any public light on a post with as a source for illuminating the area
	Crosswalks	Any signage on pavement indicating where pedestrians are permitted to cross a street
	Police Presence	Any sighting of a police officer or a patrol vehicle
	Fire Stations	Any facility with a sign designating it as a fire station
	Guard Dogs	Signs or other markers posted that indicate the presence of dogs (e.g., "beware of dog")
	Trash	Any waste accumulated; must be at least 5 pieces of 2 inches by 2 inches
Transportation	Hazardous Materials	Harmful chemicals or refuse or sites where waste is dumped
	Bus Stops	Location with signage for bus stop
	Potholes	Any hole in the street pavement the size of a dinner plate or larger
	Sidewalks	Presence of cement or brick paths adjacent to the road
	Bike Lanes	Presence of a lane in road for bike traffic

	Taxis	Presence of a vehicle identified as a taxi
Economy	Vacant Store Fronts	Any retail or business building that is not currently occupied
	Payday Advance Stores	Operating business that has signage labeling it as a payday loan or advance store
Recreational Spaces	Parks	Space for communal interactions and/or recreation for the general public
	Parks with Amenities	Any man-made item or aspect that enhances the quality of the park (e.g., playground equipment, basketball courts, water fountain, etc.)
	Public Recreational Facilities	Enclosed building visibly designated as open to the public or as a "community center"
	Recreational Facilities with Amenities	Any item or aspect that enhances the quality of the community center
	Private Recreational Facilities	Enclosed building that is not designated to be open to the public
Services	Schools	Building with sign indicating it is a school
	Elementary Schools	Building with sign indicating it is an elementary school
	Childcare/Daycare	Building with sign indicating it is a childcare or daycare
	Primary Health Care	Building with sign indicating it is a primary care facility or clinic
	Safety Net Clinics	Building identified as a "Federally Qualified Health Center" (FQHC) or "Community Health Center"
	Social Services	Building identified as a government or government supported services office
	Food Stores	Any building that sells food or groceries
	Corner Stores/Tiendas	Food store that sells mainly food and household goods
	Supermarkets	Food store with additional services available (e.g., clothing retail, auto services, eye care, etc.)
	Bars	Any facility that serves alcoholic beverages (e.g., bar, tavern, pub, etc.)
	Restaurants	Any store where one can purchase or eat a meal (e.g., fast food, dine-in, carry-out)
	Liquor Stores	Any building marked as a liquor retail outlet
	Places of Worship	Any operating church or other religious building

	Gas Stations	Building that has at least one gas pump
	Hospitals	Health care institution with signage indicating it is a hospital
	County Dental Clinics	Building providing dental care that has signage identifying it as a "County Dental Clinic"
	Farmers Markets	Any set of stands selling produce and/or meat products

Several undergraduate students affiliated with the KU Work Group for Community Health and Development were trained using the observer codebook found in Appendix D. The students piloted the checklist in a different county that served as a test location for feasibility and accuracy. The first author (primary observer) then conducted observations of environmental features in the 10 selected neighborhoods within Wyandotte County. A random sample of two lower-income neighborhoods and two higher-income neighborhoods were concurrently observed by a second independent observer, an undergraduate student not the first author, so that accuracy of scoring could be assessed using measures of inter-observer agreement.

Development of Observational System

This measurement process was designed using an observational system framework outlined in the Community Tool Box (2012). First, the experimental question was identified: Are there differential levels of exposure to environmental conditions in lower and higher-income neighborhoods for the

Latino community of Kansas City, Kansas? Second, the method chosen to address this question was direct observation of environmental features. Measures to be included were compiled through literature review and social validation of measures by researchers with experience in observational studies. The neighborhoods within Wyandotte County would be each observed one time during the course of the study. Third, codebook was devised for observers that provided behavioral definitions and scoring instructions for each measure as well as examples and non-examples. Observers were individually trained on the codebook regarding what to record and what conditions would be observed. Fourth, a second observer simultaneously to the primary observer yet independently assessed four of the ten neighborhoods to check the reliability of the environmental assessment tool. Finally, suggestions for adjustment in the measurement system were included in this study after data on inter-observer agreement were collected and analyzed.

RESULTS

Table 2 displays the overall results obtained using this measurement system.

Domains	Measure	Lower-Income		Higher-Income	
	Positive (+)/Negative (-) Measures	Mean (Block/Area)	Range	Mean (Block/Area)	Range
Housing	Broken Windows (-)	21%	7-39	5%	0-19
	Boarded Up Windows (-)	24%	18-48	19%	0-32
	Vacant Dwellings (-)	18%	6-25	15%	11-20
	For Sale/Rent (-)	15%	8-29	20%	11-38
	Fire Damage (-)	1%	0-4	0%	0-0
Safety	Barred Windows (-)	35%	19-47	12%	0-22
	Graffiti (-)	22%	10-35	4%	0-10
	Security Systems (+)	43%	7-71	62%	50-83
	Illegal Dumping (-)	13%	0-19	13%	0-50
	Street Lights (+)	96%	82-100	100%	100-100
	Crosswalks (+)	12%	0-34	11%	0-33
	Police Presence (+)	2%	0-7	2%	0-13
	Fire Stations (+)	0%	0-0	2%	0-17
	Guard Dogs (+)	15%	3-27	15%	0-25
	Trash (-)	29%	17-52	39%	11-60
	Hazardous Materials (-)	0%	0-0	0%	0-0
Transportation	Bus Stops (+)	21%	0-48	11%	0-39
	Potholes (-)	7%	0-17	6%	0-16
	Sidewalks (+)	87%	69-100	8%	0-50
	Bike Lanes (+)	0%	0-0	0%	0-0
	Taxis (+)	0%	0-0	1%	0-5
Economy	Vacant Store Fronts (-)	20%	0-46	2%	0-6
	Payday Advance Stores (-)	0%	0-0	0%	0-0
Recreational Spaces	Parks (+)	9%	0-35	4%	0-17
	Parks with Amenities (+)	6%	0-35	2%	0-17
	Public Recreational Facilities (+)	2%	0-7	0%	0-0
	Recreational Facilities with Amenities (+)	2%	0-6	0%	0-0
	Private Recreational Facilities (+)	1%	0-4	1%	1-17
Services	Schools (+)	2%	0-7	7%	0-50
	Elementary Schools (+)	2%	0-7	6%	0-17
	Childcare/Daycare (+)	0%	0-0	5%	0-33
	Primary Health Care (+)	2%	0-7	0%	0-0
	Safety Net Clinics (+)	1%	0-3	0%	0-0
	Social Services (+)	3%	0-10	0%	0-5
	Food Stores (+)	10%	0-21	1%	0-5

	Corner Stores/Tiendas (+)	8%	0-21	1%	0-5
	Supermarkets (+)	1%	0-4	0%	0-0
	Bars (-)	4%	0-19	0%	0-0
	Restaurants (+)	9%	0-21	2%	0-17
	Liquor Stores (-)	2%	0-7	0%	0-0
	Places of Worship (+)	15%	4-38	6%	0-10
	Gas Stations (+)	2%	0-4	0%	0-0
	Hospitals (+)	0%	0-0	0%	0-0
	County Dental Clinics (+)	0%	0-0	0%	0-0
	Farmers Markets (+)	0%	0-0	0%	0-0

The results show a higher percentage of some negative environmental features to which residents were exposed in the lower-income neighborhoods than the higher-income neighborhoods. Negative environmental features occurred at a higher percentage in lower-income neighborhoods than in higher-income neighborhoods for these measures: broken windows, boarded up windows, vacant dwellings, fire damaged dwellings, barred windows, graffiti, potholes, vacant storefronts bars, and liquor stores. Higher-income neighborhoods had higher percentages of positive environmental factors than did lower-income neighborhoods for some features: security systems, street lights, fire stations, taxis, schools, elementary schools, and childcare or daycare centers. Other environmental indicators showed little or no difference across neighborhoods. For instance, the percent of blocks per neighborhood in lower-income communities was equal to that of higher-income neighborhoods for the measures of illegal dumping, police presence, guard dogs, hazardous materials, bike lanes, payday advance stores, private recreational facilities, hospitals, county dental clinics, and farmers markets. For other measures, lower-income neighborhoods had lower instances of negative environmental

features and higher instances of positive environmental features. Lower-income neighborhoods had lower percentages of “for sale” and “for rent” signs than did higher-income neighborhoods as well as a lower percentage of blocks with trash per neighborhood. Additionally, lower-income neighborhoods had higher percentages than higher-income neighborhoods of several positive environmental features: crosswalks, bus stops, sidewalks, parks, parks with amenities (e.g., parks with playgrounds), public recreational facilities, recreational facilities with amenities (e.g., recreational facilities with outdoor basketball courts), primary health care centers, safety net clinics, social services, food stores, corner stores or tiendas, supermarkets, restaurants, gas stations, and places of worship.

Figures 1-6 present some illustrative graphs of selected measures. Figure 1 shows that the percentage of occurrences of broken windows, a measure of housing, was higher in the lower-income neighborhoods (21%) than in higher-income neighborhoods (5%). Figure 2 shows that the percentage of occurrences of graffiti, a measure of the safety domain, was higher in lower-income neighborhoods (22%) than in higher-income neighborhoods (4%). Percentage of occurrences of sidewalks, a

measure of transportation, was higher in lower-income neighborhoods (87%) than in higher-income neighborhoods (8%), as shown in Figure 3. Figure 4 shows that a measure of the economy, vacant storefronts, were found to occur at a higher percentage in lower-income neighborhoods (20%) than in higher-income neighborhoods (2%). The percentage of blocks per neighborhood containing parks, as shown in Figure 5, was higher in the lower-income neighborhoods (9%) than in the higher-income neighborhoods (4%). Figure 6 shows the percentage of blocks with places of worship, an example of the services domain, was higher for lower-income communities (15%) than it was for higher-income communities (6%).

Figure 1 – Housing: Broken Windows

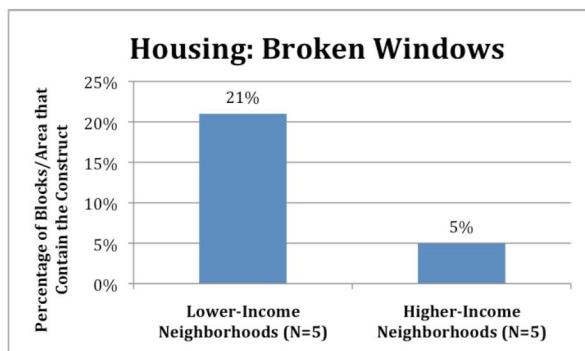


Figure 2 – Safety: Broken Windows

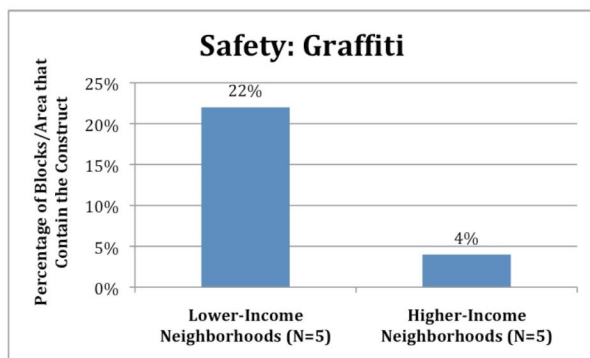


Figure 3 – Transportation: Sidewalks

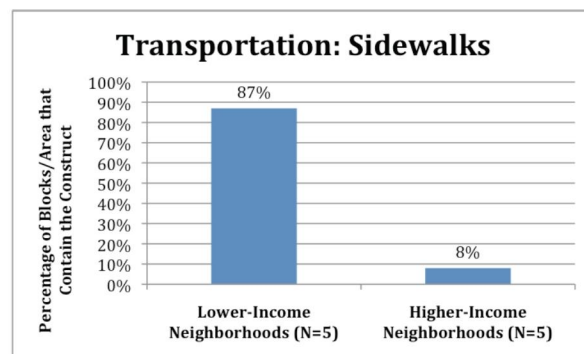


Figure 4 – Economy: Vacant Store Fronts

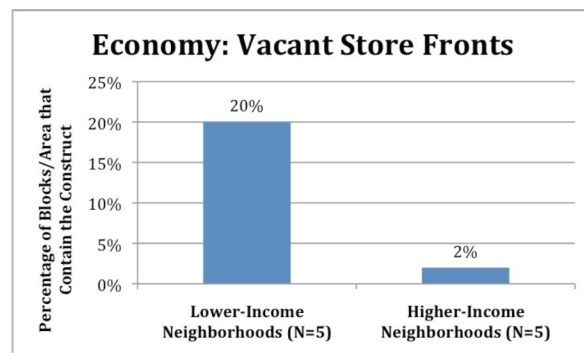


Figure 5 – Recreational Spaces: Parks

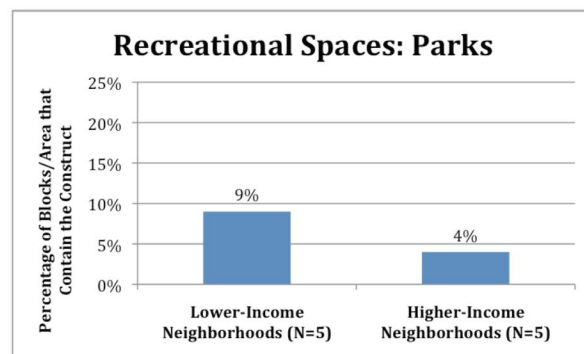
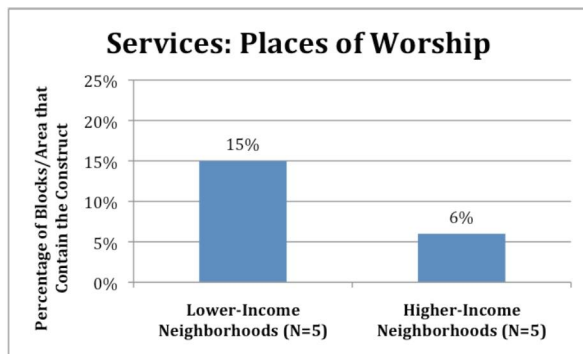


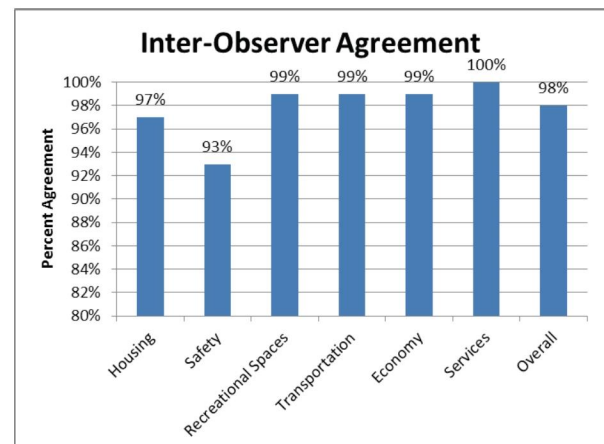
Figure 6 – Services: Places of Worship



There was also variability between the neighborhoods surveyed within each group. For example, the low-income neighborhood in census tract 420.02 had places of worship on 4% of the blocks observed whereas the lower-income neighborhood in census tract 418 had places of worship on 38% of the blocks observed. The higher-income neighborhood in the census tract 437 had 11% of blocks with “for sale” or “for rent” signs while the higher-income neighborhood in census tract 405 had “for sale” or “for rent” signs on 38% of the blocks.

Inter-observer agreement was high overall with the primary observer (first author) and secondary observers (undergraduate students) agreeing on 98% of total opportunities, as shown in Figure 7. Inter-observer agreement was higher for some indicators than for others. Inter-observer agreement was above 80% for the following measures: all measures in the services domain; all measures in the housing domain; all measures in the transportation domain; all measures in the economy domain; and the measures graffiti, police presence, fire stations, street lights, crosswalks, security systems, guard dogs, barred windows, illegal dumping, and hazardous materials. For the measure of trash, it was below 80%.

Figure 7 – Inter-Observer Agreement



DISCUSSION

Findings from this study indicate that residents of the lower-income neighborhoods had greater exposure to some environmental features associated with health disparities than those living in higher-income neighborhoods. The higher-income neighborhoods had greater percentages for some positive features such as schools, childcare and daycare centers, and streetlights; and fewer negative features such as broken windows, vacant dwellings and store fronts, and bars and liquor stores. This was consistent with the hypothesis that differential exposures (to social determinants) were related to differential income. Many measures did not show marked differences between lower-income and higher-income communities. For instance, percentage of neighborhoods with police presence, crosswalks, evidence of guard dogs, and illegal dumping were equivalent across income levels. This was not consistent with the hypothesis.

Also not consistent with the hypothesis, greater percentages of many positive environmental features occurred in lower-income communities than in the higher-income communities, such as

blocks per area containing sidewalks, parks, and places of worship. These higher percentages of positive environmental features occurred in especially high number for the domains of recreational spaces (e.g., parks and recreational spaces) and services (e.g., restaurants, places of worship). This suggests that lower-income communities may not be as resource-poor as predicted by the hypothesis. These factors are assets upon which lower-income neighborhoods can build and may serve as important environmental features to leverage toward improving community health and the health outcomes of community residents.

A limitation of this approach was the minimal adaptability of this measurement protocol to different neighborhood conditions such as population density. For example, some of the neighborhoods surveyed contained fewer houses set farther apart whereas other neighborhoods contained houses that were much closer together. The neighborhood observed in census tract 418 contained 29 blocks while the neighborhood observed in census tract 438.03 contained 6 blocks. Additionally, this study was limited by the sampling method for each neighborhood area of only surveying four one-half-mile lengths out from the central point as opposed to the entire circular area with a radius of one half-mile. As an example, several neighborhoods were known to contain features such as schools or parks that were within the circular one half-mile radius, but these features were not observed or consequently scored because they were not along any of the four lengths surveyed. These are factors that should be considered in future research.

This study also had several strengths. One strength is the practicality

of conducting the assessment. The only supplies used in observation were printed copies of the environmental assessment and clipboards. The average time spent in observation for an individual neighborhood was one hour, with a range of forty minutes to 1.5 hours. Further, this study attempted to identify and directly observe environmental features that may be related to differential exposures that contribute to health inequity, an area on which the experimenter was able to find only limited prior research. Finally, the environmental assessment was shown to have high levels of inter-observer agreement.

The findings of this study support the growing body of research connecting environment with health. The results suggest that indicators related to environmental features can be studied through direct observation. Future research should explore the question of which environmental features have the greatest correlation to social determinants and the greatest impact on health. Further research and collaborative action is also needed to establish and verify successful methods of eliminating health disparities. A potential future use of this environmental assessment is as a pre-test of neighborhoods before community organizations implement initiatives to improve health followed a second use of the assessment as a post-test of the neighborhoods after this work has been put into action. Use of this assessment in this way would serve to measure the broad effects of the community organization's work on the neighborhood residents' exposure to social determinants of health.

The Latino Health for All Coalition is taking part in such efforts to create conditions that promote health equality for Latinos in the Kansas City area.

Collaborative public health research actions should attempt to limit exposures in low-income neighborhoods. For instance, this might include community programs and policies that support access to services, places that assure opportunities for physical activity, safety improvement efforts, and economic improvement efforts within low-income areas with populations experiencing health disparities. The higher occurrences of service resources found by this study to exist in the lower-income communities support this recommendation and may be built upon for future health improvements. The goal of these efforts is to learn more about and act to reduce health inequities that prevent people from living healthy lives. We can work together to create more equitable conditions so that all people are able to live healthy lives.

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